

# THE SOFT X-RAY EMISSION COMPONENT OF SPIRAL GALAXIES

NASA Grant NAG5-1937

UN 73  
001 975

Final Report

For the Period 15 March 1992 through 14 September 1998

Principal Investigator  
Dr. Giuseppina Fabbiano

December 1998

Prepared for:

National Aeronautics and Space Administration  
Goddard Space Flight Center  
Greenbelt, Maryland 20771

Smithsonian Institution  
Astrophysical Observatory  
Cambridge, Massachusetts 02138

The Smithsonian Astrophysical Observatory is a member of the Harvard-Smithsonian Center for Astrophysics
--

The NASA Technical Officer for this grant is Dr. Robert Petre, Code 666, Laboratory for High Energy Astrophysics, Space Science Directorate, Goddard Space Flight Center, Greenbelt, Maryland 20771.



Work included the analysis of the HRI observations of the Sombrero galaxy (Fabbiano and Juda) published in Ap.J. This paper discussed the discovery of a point-like x-ray source at the nucleus of the galaxy, which is suspected to host a massive black hole. More work was done on the analysis of the Observation of M94 in support of an AXAF proposal.

We have also analyzed the M81 data by adding to our observation the entire set of the archival ROSAT data. We plan to write up the results for publication. Both galaxies have nuclei optically similar to that of the Sombrero galaxy. The nucleus of M81 is a known x-ray source. The M94 data has revealed a point-like nuclear source superposed on more diffuse emission.

A paper is in progress in collaboration with Dr. Matsushita of Tokyo University. A number of papers based on ROSAT data analysis were supported by this grant. They include.

The X-ray Emission of Galaxies, (G. Fabbiano) 1995 in *“Proceedings of Röntgenstrahlung from the Universe”*, Wurzburg, Germany (review talk).

Properties of E and S0 Galaxies (G. Fabbiano) 1995, Proc. of Fresh Views of Elliptical Galaxies, ASP Conf. Series No. 86, (San Francisco, ASP), A. Buzzoni, A. Renzini, and A. Serrano, eds., p.103 (review talk).

The X-ray Emission of E and S0 Galaxies (G. Fabbiano) 1995, to appear in the proc. of IAU Symp. No. 171, ‘New Light on Galaxy Evolution’, R. Bender, ed. (review talk).

The X-ray Properties of LINERs, (G. Fabbiano), 1995, to appear in the proc. of the STScI Workshop on LINERS (review talk).

ROSAT PSPC Observations of two x-ray-faint early-type Galaxies: NGC4365 and NGC4382 (G. Fabbiano, D.-W. Kim, and G. Trinchieri), 1994, *Ap.J.*, 429, 94.

The Very Soft X-ray Emission of X-ray faint Early-type Galaxies (S. Pellegrini and G. Fabbiano), 1994, *Ap.J.*, 429, 105.

ROSAT PSPC Observations of Two Dynamically Young Elliptical Galaxies: NGC4125 and NGC3610 (G. Fabbiano and F. Schweizer) 1995, *Ap.J.*, 447, 572.

ROSAT Observations of the Sombrero Galaxy: Discovery of an X-ray Active Nucleus (G. Fabbiano and J. Juda) 1997, *Ap.J.*, 476, 666.

ROSAT HRI Observation of the Radio Galaxy NGC1216 (Fornax A) (D.-W. Kim, G. Fabbiano, and G. Mackie), 1998 *Ap.J.*, 497, 699.

'Evolution of Gas and Stars in the Merger Galaxy NGC1316 (Fornax A) (G. Mackie and G. Fabbiano) 1998, *A.J.*, 115, 514.